

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Attorney Docket No.: 44376A

Filed: Concurrently Herewith

For: ACOUSTICAL INSULATION FOAMS

"Express Mail" mailing label number  
E1414238431US  
Date of Deposit January 4, 2002

Assistant Commissioner of Patents  
Washington, D.C. 20231

Sir:

PRELIMINARY AMENDMENT

Applicants request entry of the following amendments prior to the examination of the above-identified application.

In the Specification

At page 1, please replace the cross reference to related applications with the following cross reference;

This application is a divisional of 09/488,220 filed on October 12, 2001, now U.S. Patent No. 6,187,232, which is a continuation-in-part of Application No. 09/428,575 filed on 10/26/99, now U.S. Patent No. 6,133,333, which is a division of Application No. 09/205,938 filed on 12/04/98, now US Patent No. 6,231,795.

In the Claims

Please cancel claims 1-15 and replace them with the following new claims;

1. An acoustical insulation foam having, either with or without elastification, an Asker C hardness of less than about 65, a density of about 5 to about 150 kg/m<sup>3</sup>,

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a cell size of about 0.05 to about 15 mm, an open cell content of 0 to about 100 volume percent, a thickness of about 1 to about 200 mm, and a width of about 100 to about 3000 mm; comprising;

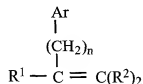
- (A) from 20 to 85 percent by weight (based on the combined weights of Component A and B) of one or more alkenyl aromatic polymers, and wherein at least one of said alkenyl aromatic polymers has a molecular weight (Mw) of from 100,000 to 500,000; and
- (B) from 15 to 80 percent by weight (based on the combined weight of Components A and B) of one or more substantially random interpolymers and
- (C) optionally, one or more nucleating agents and
- (D) optionally, one or more other additives; and
- (E) one or more blowing agents present in a total amount of from 0.4 to 5.0 gram-moles per kilogram (based on the combined weight of Components A and B); and

wherein said foam (either with or without elastification) has a dynamic modulus from about 100 to about 2000 KPa, and a damping ratio of greater than about 10.

112. The acoustical insulation foam of Claim 1 having, either with or without elastification, an Asker C hardness of less than about 60, a density of about 6 to about 100 kg/m<sup>3</sup>, a cell size of about 0.1 to about 10 mm, an open cell content of from about 10 to about 95 volume percent, a thickness of about 1.5 to about 100 mm, and a width of about 250 to about 2500 mm; and wherein

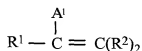
- A) in Component (A), said at least one alkenyl aromatic polymer has greater than 50 percent by weight alkenyl aromatic monomeric units, has a molecular weight (Mw) of from about 120,000 to about 350,000 and is present in an amount of from about 30 to about 80 percent by weight (based on the combined weight of Components A and B);
- B) said substantially random interpolymers, Component (B), has an I2 of about 0.3 to about 30 g/10 min and an Mw/Mn of about 1.8 to about 10; is present in an amount of from about 20 to about 70 percent by weight (based on the combined weight of Components A and B); and comprises
  - (1) from about 10 to about 43 mol % of polymer units derived from;

- (a) said vinyl or vinylidene aromatic monomer represented by the following formula;



wherein  $\text{R}^1$  is selected from the group of radicals consisting of hydrogen and alkyl radicals containing from 1 to about 4 carbon atoms; each  $\text{R}^2$  is independently selected from the group of radicals consisting of hydrogen and alkyl radicals containing from 1 to about 4 carbon atoms; Ar is a phenyl group or a phenyl group substituted with from 1 to 5 substituents selected from the group consisting of halo,  $\text{C}_{1-4}$ -alkyl, and  $\text{C}_{1-4}$ -haloalkyl; and n has a value from zero to about 4;

- (b) said sterically hindered aliphatic or cycloaliphatic vinyl or vinylidene monomer is represented by the following general formula;



wherein  $\text{A}^1$  is a sterically bulky, aliphatic or cycloaliphatic substituent of up to 20 carbons,  $\text{R}^1$  is selected from the group of radicals consisting of hydrogen and alkyl radicals containing from 1 to about 4 carbon atoms; each  $\text{R}^2$  is independently selected from the group of radicals consisting of hydrogen and alkyl radicals containing from 1 to about 4 carbon atoms; or alternatively  $\text{R}^1$  and  $\text{A}^1$  together form a ring system; or

- c) a combination of a and b; and

- (2) from about 57 to about 90 mol % of polymer units derived from ethylene and/or said  $\alpha$ -olefin which comprises at least one of propylene, 4-methyl-1-pentene, butene-1, hexene-1 or octene-1; and

(3) said ethylenically unsaturated polymerizable monomers other than those derived from (1) and (2) comprises norbornene, or a C<sub>1-10</sub> alkyl or C<sub>6-10</sub> aryl substituted norbornene; and

(C) said nucleating agent, if present, Component (C), comprises one or more of calcium carbonate, talc, clay, silica, barium stearate, diatomaceous earth, mixtures of citric acid and sodium bicarbonate; and

(D) said additive, if present, Component (D), comprises one or more of inorganic fillers, pigments, antioxidants, acid scavengers, ultraviolet absorbers, flame retardants, processing aids, extrusion aids, permeability modifiers, antistatic agents, and other thermoplastic polymers; and

(E) said blowing agent, Component (E), is present in a total amount of from about 0.6 to about 3.0 g-moles/kg (based on the combined weight of Components A and B), and comprises one or more of inorganic blowing agent(s), organic blowing agent(s), and/or chemical blowing agent(s); and wherein said foam (either with or without elastification) has a dynamic modulus from about 100 to about 1000 Kpa, and a damping ratio of greater than about 11.

14. The acoustical insulation foam of Claim 1 having, either with or without elastification, an Asker C hardness of less than about 55, a density of about 10 to about 50 kg/m<sup>3</sup>, a cell size of about 0.3 to about 2 mm, an open cell content of from about 20 to about 90 volume percent, a thickness of about 2 to about 50 mm, and a width of about 500 to about 2000 mm; and wherein

(A) in Component (A), said at least one alkenyl aromatic polymer has greater than 70 percent by weight alkenyl aromatic monomeric units, has a molecular weight (Mw) of from about 130,000 to about 325,000, a molecular weight distribution, (Mw/Mn) of from about 2 to about 7, and is present in an amount of from about 35 to about 70 percent by weight (based on the combined weight of Components A and B);

(B) said substantially random interpolymer, Component (B), has an I2 of about 0.5 to about 10 g/10 min and an Mw/Mn from about 2 to about 5, is present in an amount from about 30 to about 65 wt % (based on the combined weight of Components A and B) and comprises

(1) from about 13 to about 40 mol % of polymer units derived from;

- a) said vinyl aromatic monomer which comprises styrene,  $\alpha$ -methyl styrene, ortho-, meta-, and para-methylstyrene, and the ring halogenated styrenes, or
  - b) said aliphatic or cycloaliphatic vinyl or vinylidene monomers which comprises 5-ethylidene-2-norbornene or 1-vinylcyclo-hexene, 3-vinylcyclo-hexene, and 4-vinylcyclohexene; or
  - c) a combination of a and b; and
- (2) from about 60 to about 87 mol % of polymer units derived from ethylene, or ethylene and said  $\alpha$ -olefin, which comprises ethylene, or ethylene and at least one of propylene, 4-methyl-1-pentene, butene-1, hexene-1 or octene-1; and
- (3) said ethylenically unsaturated polymerizable monomers other than those derived from (1) and (2) is norbornene; and
- (C) said nucleating agent, if present, Component (C), comprises one or more of talc, and mixtures of citric acid and sodium bicarbonate;
- (D) said additive, if present, Component (D), comprises one or more of carbon black, titanium dioxide, graphite, flame retardants, and other thermoplastic polymers; and
- (E) said blowing agent, Component (E), is present in a total amount of from about 0.8 to about 2.5 gram-moles per kilogram (based on the combined weight of Components A and B) comprising one or more of, nitrogen, sulfur hexafluoride ( $\text{SF}_6$ ), argon, carbon dioxide, water, air and helium, methane, ethane, propane, n-butane, isobutane, n-pentane, isopentane, neopentane, cyclopentane, methanol, ethanol, n-propanol, and isopropanol, methyl fluoride, perfluoromethane, ethyl fluoride, ), 1,1-difluoroethane (HFC-152a), fluoroethane (HFC-161), 1,1,1-trifluoroethane (HFC-143a), 1,1,1,2-tetrafluoroethane (HFC-134a), pentafluoroethane (HFC-125), 1,1,2,2 tetrafluoroethane (HFC-134), 1,1,1,3,3-pentafluoropropane, difluoromethane (HFC-32), perfluoroethane, 2,2-difluoropropane, 1,1,1-trifluoropropane, perfluoropropane, dichloropropane, difluoropropane, perfluorobutane, perfluorocyclobutane, methyl chloride, methylene chloride, ethyl chloride,

1,1,1-trichloro-ethane, 1,1-dichloro-1-fluoroethane (HCFC-141b), 1-chloro-1,1-difluoroethane (HCFC-142b), chlorodifluoromethane (HCFC-22), 1,1-dichloro-2,2,2-trifluoroethane (HCFC-123) and 1-chloro-1,2,2,2-tetrafluoroethane (HCFC-124), trichloromonofluoromethane (CFC-11), dichlorodifluoromethane (CFC-12), trichloro-trifluoroethane (CFC-113), dichlorotetrafluoroethane (CFC-114), chloroheptafluoropropane, dichlorohexafluoropropane, azodicarbonamide, azodiisobutyro-nitrile, benzenesulfonylhydrazide, 4,4-oxybenzene sulfonyl-semicarbazide, p-toluene sulfonyl semi-carbazide, barium azodicarboxylate, N,N'-dimethyl-N,N'-dinitrosotere-phthalamide, trihydrazino triazine and mixtures of citric acid and sodium bicarbonate; and

wherein said foam (either with or without elastification) has a dynamic modulus from about 100 to about 600 KPa, and a damping ratio of greater than about 12.

4. The acoustical insulation foam of Claim 3 wherein said alkenyl aromatic homopolymer or copolymer, Component (A), is derived from styrene, Component (B) is a substantially random interpolmer of ethylene and styrene, and the blowing agent, Component (E), is one or more of carbon dioxide, ethane, propane, n-butane, isobutane, n-pentane, isopentane, neopentane, cyclopentane, ethanol, 1,1-difluoroethane (HFC-152a), 1,1,1,2-tetrafluoroethane (HFC-134a), 1,1,2,2 tetrafluoroethane (HFC-134), ethyl chloride, 1-chloro-1,1-difluoroethane (HCFC-142b), or chlorodifluoromethane (HCFC-22).

5. The acoustical insulation foam of Claim 3, wherein said alkenyl aromatic homopolymer or copolymer, Component (A), is derived from styrene, in said substantially random interpolmer, Component (B)(1)(a) is styrene; and Component (B)(2) is ethylene and at least one of propylene, 4-methyl-1-pentene, butene-1, hexene-1 or octene-1, and the blowing agent, Component (E), is one or more of carbon dioxide, ethane, propane, n-butane, isobutane, n-pentane, isopentane, neopentane, cyclopentane, ethanol, 1,1-difluoroethane (HFC-152a), 1,1,1,2-tetrafluoroethane (HFC-134a), 1,1,2,2 tetrafluoroethane (HFC-134), ethyl chloride, 1-chloro-1,1-difluoroethane (HCFC-142b), or chlorodifluoromethane (HCFC-22).

6. The foam of claim 1 having a multiplicity of channels extending from a surface into the foam, the channels being free of direction with respect to the longitudinal extension of the foam.

7. A soft foam having an Asker C hardness of less than about 65, comprising;

- (A) one or more alkenyl aromatic polymers, and wherein at least one of said alkenyl aromatic polymers has a molecular weight (Mw) of from about 100,000 to about 500,000; and
- (B) one or more substantially random interpolymers having an I2 of about 0.1 to about 50 g/10 min, an Mw/Mn of about 1.5 to about 20; comprising;

- (1) polymer units derived from;

- (a) at least one vinyl or vinylidene aromatic monomer, or

- (b) at least one hindered aliphatic or cycloaliphatic vinyl or vinylidene monomer, or

- (c) a combination of at least one aromatic vinyl or vinylidene monomer and at least one hindered aliphatic or cycloaliphatic vinyl or vinylidene monomer, and

- (2) polymer units derived from at least one of ethylene and/or a C<sub>3-20</sub>  $\alpha$ -olefin; and

- (3) optionally, polymer units derived from one or more of ethylenically unsaturated polymerizable monomers other than those derived from (1) and (2); and

- (C) optionally, one or more nucleating agents and

- (D) optionally, one or more other additives; and

- (E) one or more blowing agents.

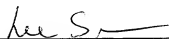
8. The soft foam of Claim 7 wherein said alkenyl aromatic polymer is a copolymer derived from an alkenyl aromatic compound and one or more C<sub>4</sub>-C<sub>6</sub> dienes.

2. The soft foam of claim 8 wherein said alkenyl aromatic polymer is selected from the group consisting of styrene/butadiene/styrene (SBS) and styrene/isoprene/styrene (SIS) copolymers.

#### REMARKS

Applicants thank Examiner for the telephone conference of September 10th 2001 concerning a first divisional (Application No. 09/689,926) of the parent (Application No. 09/488,220, now US Patent No. 6,187,232) and during which Claims 19-21 of said first divisional (Application No. 09/689,926) were allowed and also during which Applicants agreed to cancel original Claim 6 and file two further divisional applications, one of which constitutes the present application having Claims 7-12 and 16-18 of the first divisional application, now renumbered by this amendment as Claims 1- 9. Applicants respectfully request examination and allowance of all claims herein.

Respectfully submitted,

  
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